WINDING AND SPRING DESIGNATIONS
APPARATUS CONNECTING POINTS REFERRED TO IN CIRCUIT REQUIREMENTS TABLES
STANDARD SINCE 1931

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1. GENERAL

1.01 This section describes the method used since 1931 of designating the winding and spring terminals of relays and other apparatus specified as connecting points in circuit requirements tables. It also describes conventions employed to represent apparatus on attached contact type circuit drawings. Reference should be made to Section 005-120-102 covering winding and spring designation index and general information and to Section 005-120-104 covering designation standards prior to 1931.

1.02 The section is reissued to include additional relays, switches, and registers. Detailed reasons for reissue will be found at the end of the section.

1.03 The winding and contact spring designations described in this section provide means for locating springs and terminals on apparatus without the use of wiring diagrams. These designations are used on circuit requirements tables to show the point to which connections are to be made for making tests.

1.04 The figures show winding and spring designations on conventions employed to represent apparatus on attached contact type circuit drawings. The conventions may be shown on the circuit drawings either vertically or horizontally. If relays having two spring combinations are shown vertically, the top combination is shown at the top and the bottom combination is shown at the bottom. If such relays are shown horizontally, the top combination is marked TOP. Section 005-109-101 covers conventions employed to represent apparatus on detached contact type circuit drawings.

1.05 Contact springs are designated the same whether the apparatus is viewed from the front (contact side) or rear (terminal side). On many types of relays, and on some other apparatus, connections can be made to the front portion of contact springs. While the contact spring designations which are given on the circuit requirements table do not differentiate between front and rear connections, it is the general practice to connect from the front. Contact springs on which front connections are impracticable are ordinarily not specified as points to which test connections should be made.

1.06 On relays having top and bottom spring combinations, contact springs are designated by a number followed by the letter T (top) or B (bottom) to indicate that the contact spring is located in the top or bottom spring combination. While the T and B designations are neces-

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sary in circuit requirements tables and on detached contact type circuit drawings, they are not required on attached contact type circuit drawings since in these cases the springs are shown in their proper relative position, or the top springs are marked TOP as described in 1.04.

1.07 Winding terminals in most cases are designated differently depending upon whether the apparatus is viewed from the front or the rear. However, there are a number of exceptions to this, such as B-type relays, wire-spring relays, and some dry reed relays where the same designations apply to the front and rear.

1.08 On many types of apparatus, connection can be made to winding terminals from the front. When connection is to be made from the front, the designations of the winding terminals as viewed from the front are specified in the TEST CLIP DATA columns of the circuit requirements table. Similarly, when connection must be made from the rear, the designations of the terminals as viewed from the rear are used. Thus, in cases where the front and rear designations differ from each other, the circuit requirements table indicates whether connection is to be made from the front or the rear. If the winding designation as viewed from the front and rear is the same, connection should be made from the front, if practical. Refer to the section giving information on methods of making test connections to apparatus.

1.09 The inner ends of inductive windings are designated IN on the rear view terminal arrangement figures shown in Part 2. On front view winding terminal arrangement figures and on the conventions which are used to represent apparatus on attached contact type circuit drawings, the inner ends of inductive windings are indicated by solid semicircles. On detached contact type circuit drawings the solid semicircles are used to designate the inner ends of multiple inductive windings, except multiple windings on polarized relays.

1.10 Armature terminals which are not in alignment with other terminals are designated A.

2. RELAYS

ALPHABETICALLY CODED RELAYS

A-, E-, F-, H-, M-, R-, T-, AB-, EA-, and 236-Type Relays

2.01 *Contact Springs:* As viewed from the front (contact side) of the relay, contact springs are numbered consecutively from left to right. As viewed from the rear (terminal side) of the relay the contact springs are numbered consecutively from right to left.

2.02 *Balancing Springs:* Balancing springs (springs not equipped with contacts or terminals) are not numbered. Their presence in the pile-up is ignored in the numbering of the associated contact springs. Thus, where a balancing spring appears as the first spring at the left, as viewed from the front of the relay, the contact spring immediately to the right is numbered 1. Similarly, where a balancing spring is located between contact springs, the associated contact springs are numbered in the regular order without regard to the balancing spring.

2.03 *Winding Terminals:* The designations of the winding terminals differ as viewed from the front and the rear of the relay. As viewed from the front of the relay, the winding terminals are designated by two letters as described in 2.04 through 2.06. Where these two letter designations are shown on the circuit requirements table, connection to the terminal is to be made from the front of the relay. As viewed from the rear of the relay, the winding terminals are designated by a numeral and two letters as described in 2.07 through 2.11. Where these designations, consisting of a numeral and two letters, are shown on the circuit requirements table, connection to the terminal is to be made from the rear of the relay.

Winding Terminal Numbering — Viewed From the Front of the Relay

2.04 The winding terminals are designated by two letters. The first letter indicates the position of the terminal with respect to the core of the relay. The second letter indicates whether the terminal is in the top or bottom spring assembly. The designations have the following significance.

2.05 The first letter (L, R, C, or Y) locates the winding terminal with respect to the core as shown in Fig. 1. Where no more than two winding terminals are located in the top or bottom spring assembly, the designations L and R are used, L indicating a terminal to the left and R a terminal to the right of the core as viewed from the front of the relay. Where there are more than two winding terminals in one of these spring assemblies, the designations C and Y are also used. The C terminal, like the L, is located to the left of the core as viewed from the front. The Y terminal, like the R terminal, is located to the right of the core. The portions of the terminals to which connections from the front may be made are located between the rear spoolhead and the rear of the relay. The test connecting points on the C and Y terminals are located farther to the rear than the corresponding portions of the L and R terminals.

2.06 ***The second letter (T or B)*** designates a terminal in the top or bottom row, respectively.

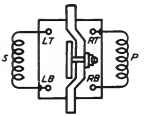


Fig. 1 – Winding Terminal Arrangement as Viewed From the Front (contact side) — A-, E-, F-, H-, M-, R-, T-, AB-, EA-, and 236-Type Relays

Winding Terminal Numbering — Viewed From the Rear of the Relay

2.07 The winding terminals are designated by a numeral and two letters. The numeral, which locates the winding terminal with respect to the contact spring terminals, may either precede or follow the letters. The letters, used in describing the winding terminals as viewed from the front, are also used to designate the same terminals as viewed from the rear. The designations are described below.

2.08 ***A numeral preceding two letters*** shows the location of the winding terminal with respect to the contact spring terminal. The numeral is the same as that of the contact spring terminal immediately to the right.

2.09 ***Where a numeral (always 1) follows the letters,*** the winding terminal is located at the extreme right in the row, or the terminal is located in a row of winding terminals only. Each terminal located in a row of winding terminals only has (1) following the letters.

2.10 ***The first letter (L, R, C, or Y)*** shows the location of the winding terminal with respect to the relay core. The terminals are arranged in two horizontal rows as shown in Fig. 2. Where no more than two winding terminals are in one row, the designations L and R are used, L designating a terminal to the right and R a terminal to the left of the core as viewed from the rear of the relay. Where there are more than two winding terminals in a row the designations C and Y are also used. The C terminal is located to the right of the L terminal and the Y terminal to the left of the R. Contact springs are often located between winding terminals, so that the winding terminals C and L or Y and R may not be adjacent to one another.

2.11 The second letter (T or B) designates a terminal in the top or bottom row, respectively.

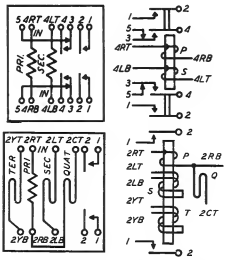


Fig. 2 – Winding and Spring Terminal Arrangement as Viewed From the Rear (terminal side) — A-, E-, F-, H-, M-, R-, AB-, EA-, and 236-Type Relays

B-, C-, G-, and J-Type Relays

2.12 As viewed from the front of the relay, contact springs are numbered from left to right.

2.13 Armatures are not designated from the front. As viewed from the rear of the relay, contact spring and winding terminals are located in three rows as shown in Fig. 3. The contact spring terminals are located in the top row and are numbered consecutively from right to left. The winding terminals are located in the middle row and are designated from right to left. The letter M following the number indicates the middle row of terminals.

2.14 Spring combinations may contain two armature springs, one of which is not electrically connected to the relay frame. Such a spring is located in the top row and takes the proper consecutive numerical designation in this row. The armature terminal electrically connected to the relay frame is located below the winding terminals and is designated A.

Exception: On the B607 and B1158 relays the armature terminal is located in the row of winding terminals. As viewed from the rear of these relays, the terminals in this row are designated 1M, A, 2M, 3M, and 4M from right to left.

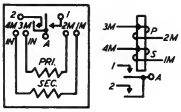


Fig. 3 – Winding and Spring Terminal Arrangement as Viewed From the Rear (terminal side) — B-, C-, G-, and J-Type Relays

L-, N-, and S-Type Relays

2.15 As viewed from the front of the relay, the left-hand contact is numbered 1, the armature is numbered 2, and the right-hand contact is numbered 3.

Exception: Contacts that do not have wiring terminals are not numbered; for example, where the front contact does not have a wiring terminal, the armature is numbered 1 and the back contact is numbered 2.

2.16 As viewed from the rear of the relay the winding and contact spring terminals are numbered consecutively from right to left as described in 2.07 through 2.11. (See Fig. 4.)

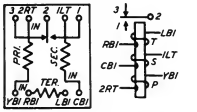


Fig. 4 – Winding and Spring Terminal Arrangement as Viewed From the Rear (terminal side) — L-, N-, and S-Type Relays

→U-, Y-, UA-, and 310-Type Relays

2.17 As viewed from the front of the relay the contact springs are located to the left and the winding terminals to the right of the relay armature.

2.18 ***Contact springs*** are numbered consecutively from left to right facing the front of the relay and from right to left facing the rear.

2.19 ***Balancing or buffer springs*** (springs not equipped with terminals or contacts) are not numbered. Thus, where a balancing or buffer spring appears as the first spring at the left, as viewed from the front of the relay, the contact spring immediately to the right is numbered 1. Similarly, where a balancing or buffer spring is located in the middle of a pile-up, the associated contact springs are numbered in the regular order without regard to the balancing or buffer spring. However, for adjustment purposes these springs are designated X and X', respectively, in the apparatus requirement and adjusting procedure sections.

2.20 ***Winding Terminals:*** The designations of the winding terminals differ as viewed from the front and rear of the relay. As viewed

from the front of the relay the winding terminals are designated by one or two letters as described in 2.21 and 2.22. Where these two letter designations are shown on the circuit requirements table, connection to the terminal is to be made from the front of the relay. As viewed from the rear of the relay the winding terminals are designated by one or two letters and a numeral as described in 2.23. Where these designations, consisting of a numeral and two letters, are shown on the circuit requirements table, connection to the terminal is to be made from the rear of the relay.

Winding Terminal Numbering — Viewed From the Front of the Relay

2.21 ***The first letter*** (on single-wound relays the only letter) is T or B. This indicates winding terminals in the top or bottom row of terminals, respectively.

2.22 ***The second letter*** is used on multiwinding relays where the terminal is located in a row containing two or more winding terminals. The second letter is F for front, C for center, or R for rear as shown in Fig. 5. These letters represent the position with respect to the front of the relay of that portion of the winding terminal located in front of the rear spoolhead. The F terminal is located nearest the armature and toward the front of the relay.

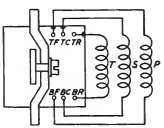


Fig. 5 — Winding Terminal Arrangement as Viewed From the Front (contact side) — U-, Y-, UA-, UB-, and 310-Type Relays ←

Winding Terminal Numbering — Viewed From the Rear of the Relay

2.23 ***Where a numeral precedes the letter T or B,*** the terminals are numbered consecutively from right to left as viewed from the rear of the relay. The T and B represent winding terminals in the top or bottom row, respectively, as shown in Fig. 6.

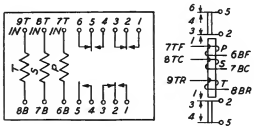


Fig. 6 — Winding and Spring Terminal Arrangement as Viewed From the Rear (terminal side) — U-, Y-, UA-, UB-, and 310-Type Relays ←

Shielding Springs

2.24 Where an electrostatic shielding spring is used, it does not in most cases extend beyond the mounting plate as viewed from the front of the relay. Only a wiring terminal appears from the terminal side. This wiring terminal is given the number of the terminal immediately to its right as viewed from the rear followed by the letter X as shown in Fig. 7, except when the spring is the first spring in the pile-up. In this case, the spring is numbered X1.

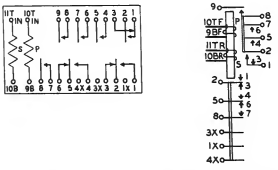


Fig. 7 — Winding and Spring Terminal Arrangement as Viewed From the Rear (terminal side) — U-, Y-, UA-, UB-, and 310-Type Relays Having Shielding Springs ←

UB Relays

2.25 The contact springs are numbered consecutively from left to right facing the front of the relay, except that the two springs which make up the armature (moving) spring of a break-make combination are numbered as one spring. These springs appear at the terminal end of the relay as one spring. In other respects, the winding and spring numbering of these relays is the same as for U-, Y-, UA-, and 310-type relays described in 2.17 through 2.24.

→**AF-, AG-, AJ-, and AL-Type Relays**

2.26 ***Contact Springs (front view)***

(a) ***12-Position Relays:*** As viewed from the front of the relay, there are 12 contact positions arranged vertically. Each position has a single fixed spring and may or may not have movable make and/or break twin springs associated with it, since not all relays have a full complement of movable springs. The make springs are located to the left of the fixed springs and the break springs to the right as shown in Fig. 8. The fixed springs are numbered consecutively from 1 to 12, beginning at the bottom. The movable twin springs are numbered the same as their associated fixed springs with the appropriate suffix M (make) or B (break).

Note: Designations on conventions representing wire-spring relays on attached contact type circuit drawings show a designation for each contact position, which consists of the contact position number prefixed by one or more letters; for example, EBM8. The letters refer to the contact arrangement in the contact position. The meaning of the combinations of letters covering the various contact arrangements is described in the section on apparatus requirement and adjusting procedures for these relays.

(b) ***24-Position Relay:*** As viewed from the front of the relay, there are 24 contact positions arranged in two vertical rows of 12 each. Each position has a single fixed contact spring and a pair of associated movable make twin contact springs. The movable make springs are located to the left of their associated fixed springs. The springs in the left vertical row of fixed springs are numbered consecutively from 1 to 12, beginning at the bottom, and those in the right vertical row are numbered from 13 to 24, beginning at the bottom. The movable make twin contact springs are numbered the same as their associated fixed springs with the suffix M. The designations are shown in Fig. 9.

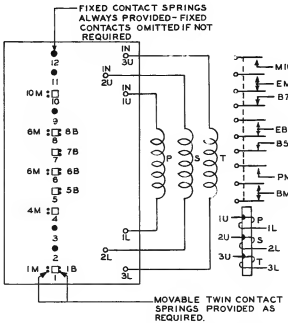


Fig. 8 — Winding and Contact Spring Arrangement as Viewed From the Front (contact side) — 12-Position AF-, AG-, AJ-, and AL-Type Relays

2.27 ***Spring Terminals (rear view)***

(a) ***General:*** As viewed from the rear, the terminals are arranged in vertical rows. The terminal rows for fixed springs always have six terminals in a row since all relays are equipped with a full complement of fixed springs. The terminal rows for the make or break springs may have less than six terminals. The terminals provided in these rows are numbered the same as if the relay were equipped with a full complement of make or break springs. However, terminals for make and break springs have the suffix M or B, respectively. Identification of make or break spring terminals may be facilitated by reference to fixed spring terminals, since all terminals in the same horizontal row have the same number.

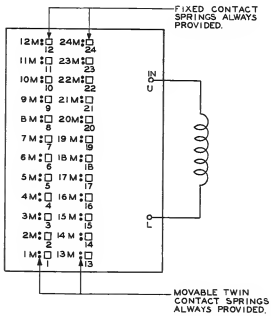


Fig. 9 — Winding and Contact Spring Arrangement as Viewed From the Front (contact side) — 24-Position AJ-Type Relay

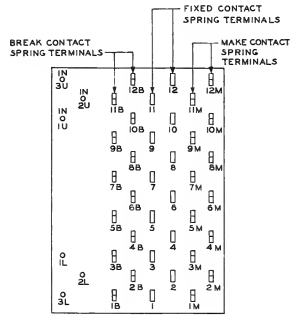


Fig. 10 — Winding and Spring Terminal Arrangement as Viewed From the Rear (terminal side) — 12-Position AF-, AG-, AJ-, and AL-Type Relays

(b) ***12-Position Relay:*** If the relay has a full complement of springs, there are six vertical rows of six terminals each as shown in Fig. 10. Starting from the right, the first pair of rows is for the make contact springs, the second pair for the fixed contact springs, and the third pair for the break contact springs. The left row of terminals in each pair is odd-numbered from 1 to 11 beginning at the bottom, and the right row in the pair is even-numbered from 2 to 12. Terminals for make and break springs have the suffix M or B, respectively.

(c) ***24-Position Relay:*** As viewed from the rear, the terminals are arranged in eight vertical rows of six each as shown in Fig. 11. Starting from the right, the first pair of terminal rows is for 12 movable make contact springs and the second pair for their associated fixed contact springs. The third pair of rows is for an additional 12 movable make contact springs and the fourth pair for their associated fixed contact springs. In the two pairs of terminal rows at the right, the terminals in the left row of each pair are odd-numbered from 1 to 11, beginning at the bottom, while the terminals in the right row of these pairs are even-numbered from 2 to 12. In the two pairs of terminal rows at the left, the terminals in the left row of each pair are odd-numbered from 13 to 23, beginning at the bottom, while the terminals in the right row of these pairs are even-numbered from 14 to 24. All make terminals have the suffix M.

2.28 ***Winding Terminals:*** Winding terminals are provided as required and extend from the front of the relay, where test connections may be made, to the rear where the external wiring is connected. As viewed from the front, the winding terminals are arranged in two groups to the right of the core as shown in Fig. 8. Referring to the figure, the terminals in the upper group, on multiple-wound relays are designated 1U, 2U, and 3U; those in the lower group are 1L, 2L, and 3L. On single-wound relays the upper terminal is designated U and the lower terminal L. As viewed from the rear, the winding terminals are located to the left of the contact spring terminals and are designated the same as when viewed from the front.

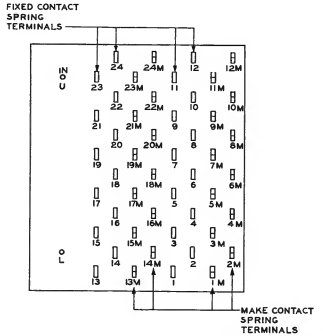


Fig. 11 – Winding and Terminal Arrangement as Viewed From the Rear (terminal side) — 24-Position AJ-Type Relay

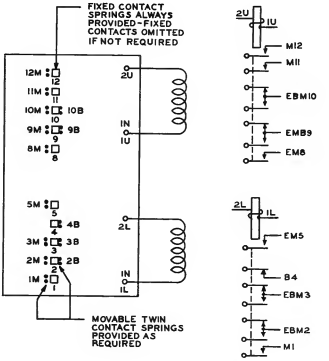


Fig. 12 – Winding and Contact Spring Arrangement as Viewed From the Front (contact side) — → AK- and AM-Type Relays

→AK- and AM-Type Relays

2.29 *Contact Springs* (front view): As viewed from the front of the relay there are 10 contact positions arranged vertically in two groups of five each as shown in Fig. 12. The contact springs are numbered as if there were twelve positions as in the case of 12-position AF-, AG-, →AJ-, or AL-type relays shown in Fig. 8. Positions 6 and 7 are omitted, this space being taken by part of the two cards of the relay. Each position has a single fixed spring and may or may not have movable make and/or break twin springs associated with it, since not all relays have a full complement of movable springs. The make springs are located to the left of the fixed springs and the break springs to the right. The fixed springs in the lower group are numbered consecutively from 1 to 5, beginning at the bottom. The springs in the upper group are numbered from 8 to 12. The movable twin springs are numbered the same as their associated fixed springs with the appropriate suffix M (make) or B (break).

Note: See note under 2.26.

2.30 *Spring Terminals* (rear view): If the relay has a full complement of springs there are six vertical rows of five terminals each as shown in Fig. 13. Starting from the right, the first pair of rows is for the make springs, the second pair for the fixed springs, and the third pair for the break springs. The left row of terminals in each pair is odd-numbered from 1 to 11 starting at the bottom and omitting number 7. The right row of terminals in each pair is even-numbered from 2 to 12 starting at the bottom and omitting number 6. The terminals for make and break springs have the suffix M and B, respectively. The terminal rows for the make and break springs may have less than five terminals. The terminals provided in these rows are numbered the same as if the relay were equipped with a full complement of make or break springs. Identification of make or break springs may be facilitated by reference to fixed spring terminals, since all terminals in the same horizontal row have the same number.

2.31 ***Winding Terminals:*** Winding terminals are provided as required and extend from the front of the relay, where test connections can be made, to the rear where the external wiring is connected. As viewed from the front, the winding terminals are to the right of the relay core as shown in Fig. 12. The terminals for the upper coil appear near the top of the spoolhead and those of the lower coil near the bottom of the spoolhead, the four terminals being in a vertical line. The terminals of the upper coil are designated 1U and 2U from the bottom up, and those of the lower coil are designated 1L and 2L from the bottom up. As viewed from the rear, the winding terminals are located to the left of the contact spring terminals, and are designated the same as when viewed from the front.

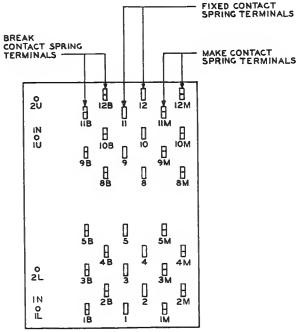


Fig. 13 – Winding and Spring Terminal Arrangement as Viewed From the Rear (terminal side) — AK- and AM-Type Relays

BF-, BJ-, and BL-Type Relays

2.32 ***Contact Springs (front view)***

(a) ***6-Position Relays:*** As viewed from the front of the relay, with the winding on the right side, there are 6 contact positions arranged vertically. Each position has a single fixed spring and may or may not have movable make and/or break twin springs associated with it, since not all relays have a full complement of movable springs. The make springs are located to the left of the fixed springs and the break springs to the right as shown in Fig. 14. The fixed springs are numbered consecutively from 1 to 6, beginning at the bottom. The movable twin springs are numbered the same as their associated fixed springs with the appropriate suffix M (make) or B (break).

Note: Designations on conventions representing miniature wire spring relays on attached contact type circuit drawings show a designation for each contact position, which consists of the contact position number prefixed by one or more letters; for example, EBM4. The letters refer to the contact arrangement in the contact position. The meaning of the combinations of letters covering the various contact arrangements is described in the section on apparatus requirement and adjusting procedures for these relays.

(b) ***12-Position Relays:*** As viewed from the front of the relay, with the winding on the right side, there are 12 contact positions arranged in two vertical rows of 6 each. Each position has a single fixed contact spring and may or may not have movable make and/or break twin springs associated with it, since not all relays have a full complement of movable

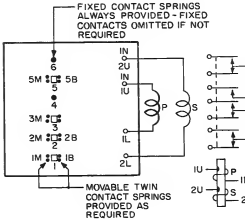


Fig. 14 – Winding and Contact Spring Arrangement as Viewed From the Front (contact side) — 6-Position BF- and BL-Type Relays

springs. The make springs are located to the left of the fixed springs and the break springs to the right as shown in Fig. 15. The springs in the right vertical row (nearest the winding) are numbered consecutively from 1 to 6, beginning at the bottom and those in the left vertical row are numbered from 7 to 12 beginning at the bottom. The movable twin springs are numbered the same as their associated fixed springs with the appropriate suffix M (make) or B (break).

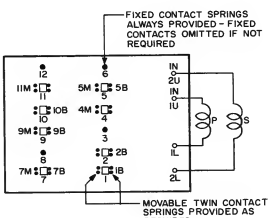


Fig. 15 – Winding and Contact Spring Arrangement as Viewed From the Front (contact side) — 12-Position BJ-Type Relay

six make contact springs. The fifth row is for their associated fixed contact springs and the sixth row is for an additional six break contact springs. The terminals in each row are numbered 1 to 6 beginning at the bottom. Terminals for the make and break springs have the suffix M or B respectively.

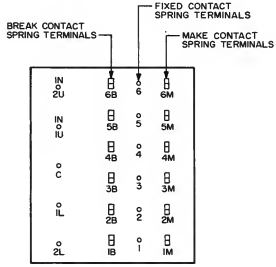


Fig. 16 – Winding and Spring Terminal Arrangement as Viewed From the Rear (terminal side) — 6-Position BF- and BL-Type Relays

2.33 ***Spring Terminals (rear view)***

(a) ***6-Position Relays:*** If the relay has a full complement of springs, there are three vertical rows of six terminals each as shown in Fig. 16. Starting from the right, the first row is for the make contact springs, the second row for the fixed contact springs, and the third row for the break contact springs. The terminals in each row are numbered from 1 to 6 beginning at the bottom. Terminals for the make and break springs have the suffix M or B respectively.

(b) ***12-Position Relay:*** If the relay has a full complement of springs, there are six vertical rows of six terminals each as shown in Fig. 17. Starting from the right, the first row is for the make contact springs, the second row for the fixed contact springs and the third row for the break contact springs. The terminals in each row are numbered 7 to 12 beginning at the bottom. The fourth row is for an additional

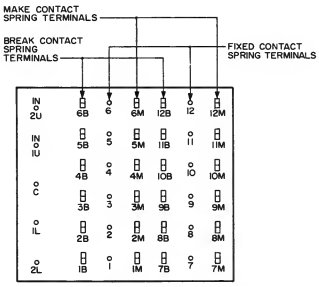


Fig. 17 – Winding and Spring Terminal Arrangement as Viewed From Rear (terminal side) — 12-Position BJ-Type Relay

2.34 ***Winding Terminals:*** Winding terminals are provided as required. As viewed from the rear the winding terminals are arranged in a vertical row to the left of the contact spring terminals as shown in Fig. 18. Referring to Fig. 18, the two upper terminals are designated 1U and 2U. The two lower terminals are designated 1L and 2L. On single-wound relays the winding may terminate on terminals 1 or 2. On double-wound relays the primary winding terminates on 1U and 1L and the second winding terminates on 2U and 2L. The center terminal designated C is used to terminate a tap on either the primary or secondary winding. Typical winding arrangements are shown in Fig. 18.

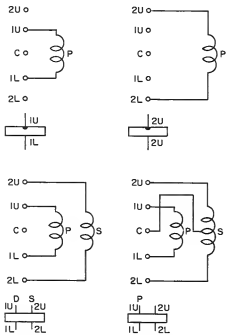


Fig. 18 – Typical Winding Arrangements for BF-, BJ-, and BL-Type Relays

MA- and MB-Type Relays

2.35 ***Contact Springs (front view)***

(a) ***4-Position MA-Type Relays:*** As viewed from the front of the relay, with the winding on the left side, there are four contact positions arranged vertically. Each position has a single fixed spring and may or may not have movable make and/or break twin springs associated with it, since not all relays have a full complement of movable springs. The make springs are located to the left of the fixed springs and the break springs to the right as shown in Fig. 19. The fixed springs are numbered consecutively from 1 to 4 beginning at the bottom. The movable twin springs are numbered the same as their associated fixed springs with the suffix M (make) or B (break).

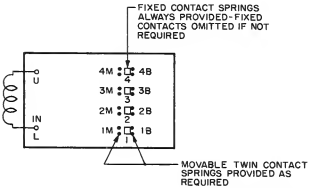


Fig. 19 – Winding and Contact Spring Arrangement as Viewed From the Front (contact side) — 4-Position MA-Type Relay

(b) ***6-Position MB-Type Relays:*** As viewed from the front of the relay, with the winding on the left side, there are six contact positions arranged vertically. Each position has a single fixed spring and may or may not have movable make and/or break twin springs associated with it, since not all relays have a full complement of movable springs. The make contacts are located to the left of the fixed springs and the break springs to the right as shown in Fig. 20. The fixed springs are numbered 1 to 6 beginning at the bottom. The movable twin springs are numbered the same as their associated fixed springs with the suffix M (make) or B (break).

2.36 ***Spring and Winding Terminals***

(a) ***4-Position MA-Type Relays:*** As viewed from the rear of the relay, there are three vertical rows of 4 spring terminals each as shown in Fig. 21. Starting at the left, the first row is for the break contact springs, the second row for the fixed contact springs, and the

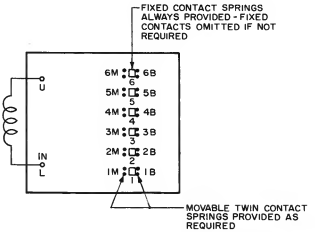


Fig. 20 – Winding and Contact Spring Arrangement as Viewed From the Front (contact side) — 6-Position MB-Type Relay

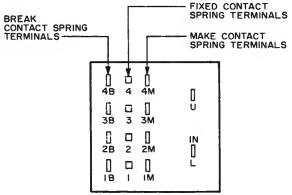


Fig. 21 – Winding and Spring Terminal Arrangement as Viewed From the Rear (terminal side) — 4-Position MA-Type Relay

third row for the make contact springs. The terminals in each row are numbered from 1 to 4 beginning at the bottom. Terminals for the make and break springs have the suffix M or B respectively. The winding terminals are arranged in a vertical row to the right of the contact spring terminals as shown in Fig. 21. The upper winding terminal is designated U and the lower terminal L.

(b) ***6-Position MB-Type Relays:*** As viewed from the rear of the relay, there are three vertical rows of 6 spring terminals each as shown in Fig. 22. Starting at the left, the first row is for the break contact springs, the second row for the fixed contact springs, and the third row for the make contact springs. The terminals in each row are numbered from 1 to 6 beginning at the bottom. Terminals for the make and break springs have the suffix M or B respectively. The winding terminals are arranged in a vertical row to the right of the contact spring terminals as shown in Fig. 22. The upper winding terminal is designated U and the lower terminal L.

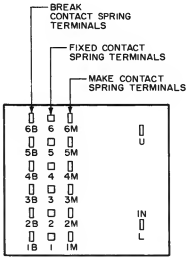


Fig. 22 – Winding and Spring Terminal Arrangement as Viewed From the Rear (terminal side) — 6-Position MB-Type Relay

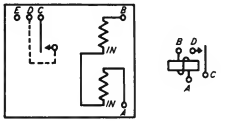


Fig. 23 – Winding and Spring Terminal Arrangement as Viewed From the Front (contact side) — 21-Type Telegraph Relay

NUMERICALLY CODED RELAYS

21-Type Telegraph Relays

2.37 Facing the front or contact side of the relay the terminals are numbered as shown in Fig. 23.

44-Type Relays

2.38 The armature (frame terminal) is designated A and the front contact is designated 1. The winding terminals are designated as shown in Fig. 24.

85-Type Relays

2.39 The front contact spring is indicated by 1 and the armature by 2. On those relays having two contact springs, the front contact spring is indicated by 1 and the spring that rests on the armature stud is indicated by 2. The relative location of the winding and spring terminals and typical designations are shown on Fig. 25.

87-Type Relays

2.40 The contact terminals are numbered consecutively from right to left facing the terminal side of the relay with the suffix T (top) or B (bottom). On those relays having only a front contact, the spring operated by the armature stud is indicated by 1T and the front contact spring is indicated by 2T. On those relays having a front and back contact, the spring operated by the armature stud is indicated by 1T, the front contact spring by 2T, the back contact by 1B, and the armature by 2B. The relative positions and designations of the winding terminals are shown on Fig. 26.

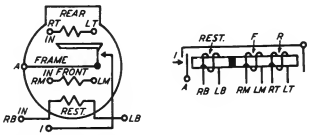


Fig. 24 – Winding and Spring Terminal Arrangement as Viewed From the Rear (terminal side) — 44-Type Relay

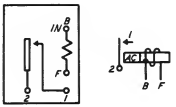


Fig. 25 – Winding and Spring Terminal Arrangement as Viewed From the Front (contact side) — 85-Type Relay

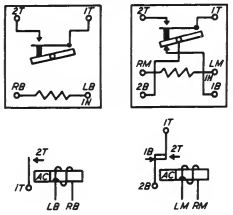


Fig. 26 – Winding and Spring Terminal Arrangement as Viewed From the Rear (terminal side) — 87-Type Relay

89-, 101-, 105-, 108-, 118-, 172-, 189-, 190-, 208-, 214-, and 253-Type Relays

2.41 The winding and contact terminal numbering is the same as covered in 2.37. These relays are, however, always mounted as shown in Fig. 27 through 30.

114-, 124-, 126-, 174-, and 198-Type Relays

2.42 The front contact is indicated by 1, the armature by A, and the back contact by 2 except on relays having only a back contact in which case the back contact is indicated by 1 and the armature by A. Fig. 31 shows the relative location of the winding terminals of these relays, as viewed from the rear, when mounted with the retractile spring at the right. The test clip data specified on the circuit requirements table are based on this position of mounting. If the relay is mounted with the retractile spring in any other position, the test clip data should be translated to care for this position of mounting.

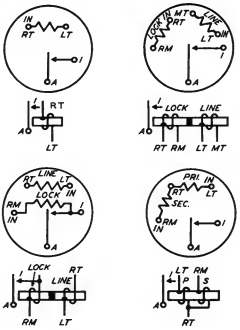


Fig. 27 – Winding and Spring Terminal Arrangement as Viewed From the Rear (terminal side) — 89-, 101-, 105-, 108-, 118-, and 172-Type Relays

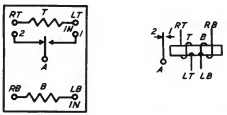


Fig. 28 – Winding and Spring Terminal Arrangement as Viewed From the Rear (terminal side) — 190-Type Relay

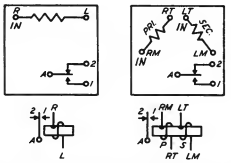


Fig. 29 – Winding and Spring Terminal Arrangement as Viewed From the Rear (terminal side) — 208-, 214-, and 253-Type Relays

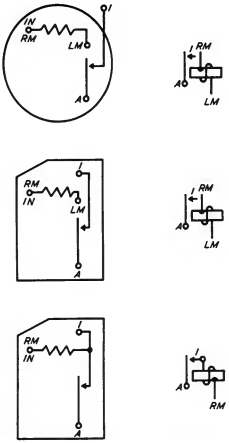


Fig. 30 – Winding and Spring Terminal Arrangement as Viewed From the Rear (terminal side) — 189-Type Relay

121-, 122-, 125-, 149-, 162-, 178-, and 179-Type Relays

2.43 The contact terminals are numbered diagonally downward from right to left facing the rear of the relay. On the 125- and 179-type relays, the middle contact terminals have a suffix M. The relative location of the winding terminals as viewed from the terminal side and typical designations are shown in Fig. 32.

150-Type Relays

2.44 The contact and winding terminals are numbered consecutively from right to left facing the front end of the relay as shown in Fig. 33.

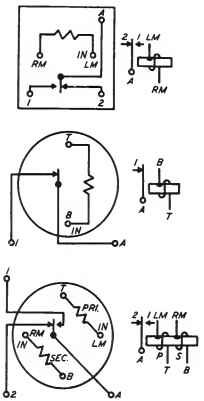


Fig. 31 – Winding and Spring Terminal Arrangement as Viewed From the Rear (terminal side) — 114-, 124-, 126-, 174-, and 198-Type Relays

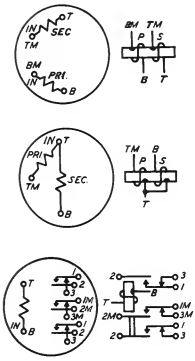


Fig. 32 – Winding and Spring Terminal Arrangement as Viewed From the Rear (terminal side) — 121-, 122-, 125-, 149-, 162-, 178-, and 179-Type Relays

177- and 203-Type Relays

2.45 As viewed from the front of the relay the front contacts are numbered 1 and 4, the travel springs (the springs picked up by the hard rubber bridge) 2 and 5, and the back contacts 3 and 6. The winding terminal designations as viewed from the terminal side are shown in Fig. 34. The designations + and − shown in Fig. 34 indicate which polarity of the battery should be connected to this point.

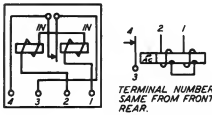


Fig. 33 – Winding and Spring Terminal Arrangement as Viewed From the Front (contact side) — 150-Type Relay

186-Type Relays

2.46 The spring operated by the armature stud is numbered 1 and the front contact is numbered 2 as shown in Fig. 35. The top winding terminal is designated 1T and the bottom winding terminal is designated B.

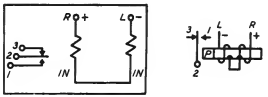


Fig. 34 – Winding and Spring Terminal Arrangement as Viewed From the Rear (terminal side) — 177- and 203-Type Relays

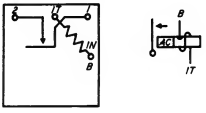


Fig. 35 – Winding and Spring Terminal Arrangement as Viewed From the Rear (terminal side) — 186-Type Relay

196-Type Relays

2.47 The contact terminals are numbered consecutively from right to left facing the terminal side of the relay. The front contact is numbered 1, the armature 2, and the back contact 3 except on relays having only a back contact, in which case the armature is numbered 1 and the back contact 2. The relative location of the winding and contact terminals as viewed from the terminal side, and typical designations are illustrated in Fig. 36. Facing the contact side of the relay, the L and R winding terminals are at the left and right sides of the spoolhead, respectively.

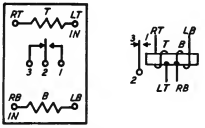


Fig. 36 – Winding and Spring Terminal Arrangement as Viewed From the Rear (terminal side) — 196-Type Relay

206-, 227-, 231-, 239-, and 280-Type Relays

2.48 The contact and winding terminals are numbered consecutively from right to left facing the terminal side of the relay as shown in Fig. 37.

207-, 213-, and 268-Type Relays

2.49 The armature (frame terminal) is designated A and the front contact or make contact screw is designated 1. The winding terminals are designated as shown in Fig. 38.

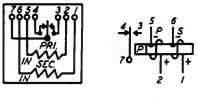


Fig. 37 – Winding and Spring Terminal Arrangement as Viewed From the Rear (terminal side) — 206-, 227-, 231-, 239-, and 280-Type Relays

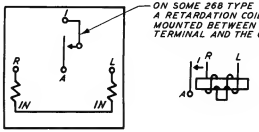


Fig. 38 – Winding and Spring Terminal Arrangement as Viewed From the Rear (terminal side) — 207-, 213-, and 268-Type Relays

209-, 215-, 218-, 228-, and 255-Type Relays

2.50 Facing the terminal side of the relay, terminals are numbered as shown in Fig. 39 through 42. On the 209-type relay, numbers 1, 6, and 11, shown on Fig. 39 are stamped in the terminal block. The other terminals are numbered consecutively from top to bottom in each row. Terminal numbers of the 215-, 218-, 228-, and 255-type relays are similarly stamped in the terminal block. Connections between terminals and contact springs and coil windings with which they are associated are shown on the relay conventions on the circuit drawing.

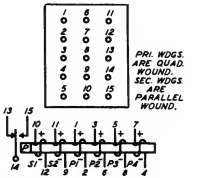


Fig. 39 – Winding and Spring Terminal Arrangement as Viewed From the Rear (terminal side) — 209-Type Relays

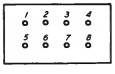


Fig. 40 – Winding and Spring Terminal Arrangement as Viewed From the Rear (terminal side) — 215- and 255-Type Relays

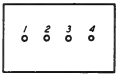


Fig. 41 – Winding and Spring Terminal Arrangement as Viewed From the Rear (terminal side) — 218-Type Relays

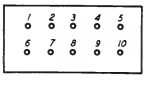


Fig. 42 – Winding and Spring Terminal Arrangement as Viewed From the Rear (terminal side) — 228-Type Relays

221-, 222-, 223-, 224-, 247-, 248-, 251-, 252-, 305-, 307-, and 309-Type, and Similar Automatic Electric Company Type Relays

2.51 The springs in an assembly are consecutively numbered outward from the frame on which the assembly is mounted; that is, the springs on a right-hand relay are consecutively numbered from left to right and on a left-hand relay from right to left. The connecting point is indicated by the relay letter designation preceded by the spring number. Where the designation X follows a numeral it indicates a spring having no soldering terminal or contact, and is located, on a left-hand relay, to the immediate left of the spring having the same numerical designation and, on a right-hand relay, to the immediate right of the spring having the same numerical designation. If no numeral precedes the designation X, it indicates that such a spring is the first spring in the pile-up. For example: the numeral 3 indicates spring No. 3 of the relay while 2B would indicate spring No. 2 in the bottom spring combination of the relay. The winding terminals are arranged as illustrated in Fig. 43.

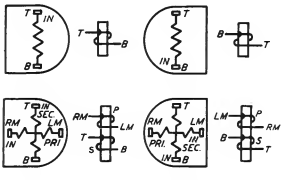


Fig. 43 – Winding Terminal Arrangement as Viewed From the Rear (terminal side) — 221-, 222-, 223-, 224-, 247-, 248-, 251-, 252-, 305-, 307-, and 309-Type, and Similar Automatic Electric Company Type Relays

225-Type Relays and Similar Automatic Electric Company Pivot Type Relays

2.52 The winding terminals are indicated by T (top) and B (bottom) with the spring combination uppermost. On relays with more than two winding terminals, the letters T and B are followed by the letters F (front) and R (rear), the armature end of the relay being considered the front. The springs in an assembly are consecutively numbered outward from the frame on which the assembly is mounted. Fig. 44 shows the winding terminal arrangement as viewed from the rear.

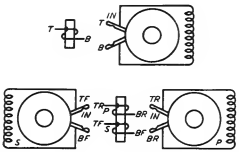


Fig. 44 – Winding Terminal Arrangement as Viewed From the Rear — 225-Type and Similar Automatic Electric Company Pivot Type Relays

229-, 230-, and 232-Type Relays

2.53 The contact terminals are numbered consecutively from right to left facing the terminal side of the relay with the suffix T (top) and B (bottom) as shown in Fig. 45 and 46 except on relays used in equipment where the contact terminals are identified by functional designations.

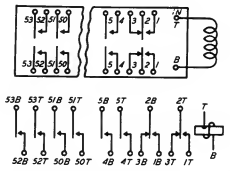


Fig. 45 – Winding and Spring Terminal Arrangement as Viewed From the Rear (terminal side) — 229-Type Relay

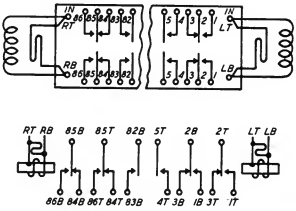


Fig. 46 – Winding and Spring Terminal Arrangement as Viewed From the Rear (terminal side) — 230- and 232-Type Relays

235-Type Relays

2.54 Facing the front of the relay the contact springs are numbered consecutively from left to right. Facing the rear the contact and heater unit terminals are numbered from right to left as shown in Fig. 47. The terminals are designated by a number followed by T or B depending upon whether the terminal is in the top or bottom row. Heater unit terminals on these relays cannot be connected to from the front. On the circuit drawing the terminals are designated by a number followed by T or B.

Note: On some circuits the 235A relay heater unit winding terminals were numbered 1, 1LT, 1RT, and 2 starting at the right as viewed from the rear.

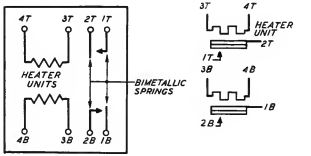


Fig. 47 – Winding and Spring Terminal Arrangement as Viewed From the Rear (terminal side) — 235-Type Relays

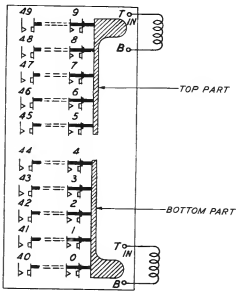
236-Type Relays

2.55 Refer to 2.01 for the winding and spring terminal arrangement and numbering of 236-type relays.

245-, 254-, 263-, and 264-Type Relays

2.56 The contact springs are numbered consecutively in vertical rows of ten pairs of springs starting at the bottom with pair 0 in the row nearest the vertical armature as shown in Fig. 48 and continuing with each vertical row of springs from right to left facing the contact side of the relay. Either half of a relay may be operated separately or both halves may be operated together, the numbering of the contact springs being the same in each case. Where both halves are operated together the schematic drawing shows the two windings in multiple and shows a single armature and all the contact spring pairs. In case both halves of the relay perform identical functions but operate separately, one magnet and set of springs are shown with two sets of spring numbers. Otherwise each half is shown as a separate relay with its own arma-

ture and its associated springs. On the schematic drawing the contact springs are not necessarily shown in numerical order. The winding terminals of each magnet are designated T (top) and B (bottom).



50 CONTACT RELAY

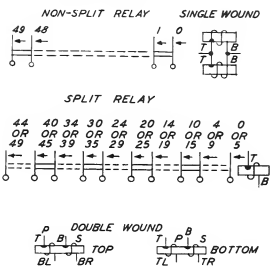


Fig. 48 — Winding and Contact Spring Arrangement as Viewed From the Front (contact side) — 245-, 254-, 263-, and 264-Type Relays

260-Type and Other Voltmeter and Milliammeter Relays

2.57 The terminal designations for these relays are stamped on the relays.

266-Type Relays

2.58 ***Contact Springs:*** As viewed from the front of the relay, contact springs are numbered consecutively from left to right considering the relay as one unit. As viewed from the rear of the relay the contact springs are numbered consecutively from right to left considering the relay as one unit as shown in Fig. 49. Cover-operated springs (springs operated when the cover is mounted on the relay), which are not designated on the circuit convention, are numbered the same as armature-operated springs.

2.59 ***Balancing Springs:*** The information for balancing springs is the same as that for E-, R-, and similar-type relays described in 2.02.

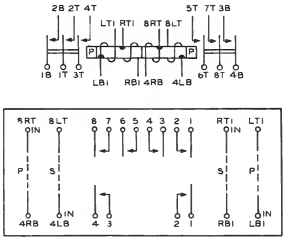


Fig. 49 — Winding and Spring Terminal Arrangement as Viewed From the Rear (terminal side) — Double-Wound 266-Type Relay

2.60 ***Winding Terminal Numbering:*** Since these relays have individual covers it is not possible to connect to the winding terminals from the front. As viewed from the front the winding terminals are designated as shown in Fig. 50. As viewed from the rear the winding terminals are designated by two letters and a number. The first letter of the designation is either L or R; the second letter either T or B. The letters and numerals have the following significance.

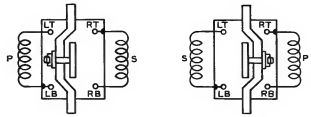


Fig. 50 – Winding Terminal Arrangement as Viewed From the Front (contact side) — Double-Wound 266-Type Relay

2.61 ***A numeral before two letters*** locates the winding terminal with respect to the contact spring terminals. The numeral is the same as that of the contact spring terminal immediately to the right as viewed from the rear.

2.62 ***Where the numeral 1 follows the letters,*** the winding terminal is located at the right of the number 1 contact spring terminal. It is the first terminal in the row where the unit has one winding, or the first or second terminal where the unit has two windings. (See Fig. 49.)

2.63 ***The first letter L or R,*** locates the winding terminal with respect to the relay core on which the winding is located. On a relay where each unit has one winding, the winding on the left unit is located to the left of the core of the left unit as viewed from the rear, and the winding of the right unit is located to the right of the core of the right unit. When each unit of the relay has two windings, the winding terminals of one winding of each unit are located to the left of the core on that unit; and the winding terminals of the other winding of each unit are located to the right of the core of that unit as shown in Fig. 49. Thus each such relay has two terminals designated LT, RT, LB, and RB. They can be distinguished from one another by the contact spring number associated with the letters.

2.64 ***Circuit Convention:*** The spring numbering on the circuit drawing includes the letters T (top) and B (bottom). The circuit drawing specifies the polarity of the winding terminals which will operate the contacts on the left or right side of the relay.

Note: Plus (+) and minus (−) signs have in some cases been shown at each end of the relay core convention to indicate the polarity which would operate the contacts shown at that end of the relay core.

267-Type Relays

2.65 As viewed from the front, the contact and winding terminals are numbered consecutively from 1 up starting at the left as shown in Fig. 51. However, the front and back contacts (numbered 3 and 4, respectively, at the rear) connect directly to the wiring terminals, and do not appear among the terminals used to connect to the relay from the front. Viewed from the front, the terminals which extend forward from the terminal assembly have the same number as they do at the rear. They therefore number from left to right as viewed from the front starting with 1. As viewed from the rear the contact and winding terminals are numbered consecutively from 1 up, starting at the right as shown in Fig. 52.

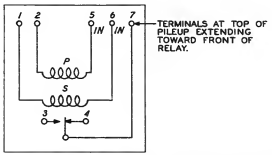


Fig. 51 – Winding and Spring Terminal Arrangement as Viewed From the Front (contact side) — 267-Type Relays

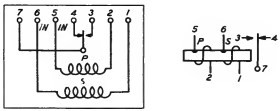


Fig. 52 – Winding and Spring Terminal Arrangement as Viewed From the Rear (terminal side) — 267-Type Relays

271-Type Relays

2.66 As viewed from the front, all springs on the relay are located to the left of the armature. The winding terminals of both the inductive winding (U-type relay coil) and the heater winding are located to the right. All winding terminals and all springs are designated the same as for U-type relays as described in 2.17 through 2.24. As viewed from the rear, the contact spring and winding terminals are designated as shown in Fig. 53. The circuit convention differs from that of the U-type relay in that it includes the thermal unit (heater unit and bimetallic contact springs).

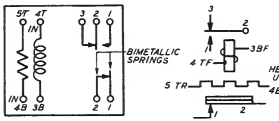


Fig. 53 — Winding and Spring Terminal Arrangement as Viewed From the Rear (terminal side) — 271-Type Relays

275-, 276-, 291-, 292-, 301-, 303-, 320-, and 321-Type Relays

2.67 The contact and winding terminals are numbered in accordance with the BSP figures referred to on the circuit requirements table and shown in the apparatus requirement and adjusting procedures section covering these relays. As viewed from the base of the socket, the terminals are numbered numerically clockwise starting at the key as shown in Fig. 54. The terminals of 275-, 276-, 291-, 303-, and 320-type relays are numbered from 1 to 8, and those of 292-, 301-, and 321-type relays are numbered from 1 to 11 starting at the key.

281-Type Relays

2.68 ***Replacements for D-178265 and D-178266 Relays:*** The winding terminals are numbered 1 and 2 and are designated on the terminal spoolhead as shown in Fig. 55. The relay contact spring leads, one at each end of the relay, are not designated.

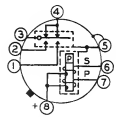


Fig. 54 — Winding and Spring Terminal Arrangement as Viewed From the Base — 275-, 276-, 291-, 303-, and 320-Type Relays

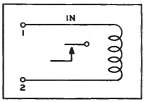


Fig. 55 — Winding Terminal Numbering — 281-Type Relay

282-Type Relays

2.69 As viewed from the front, all springs on the relay, and the terminals of the heater winding of the thermal unit are located to the left of the armature. The terminals of the inductive windings (Y-type relay coil) are located to the right. All springs and all winding terminals except those of the heater winding are designated the same as on Y-type relays described in 2.17 through 2.24. The terminals of the heater unit winding, located to the left of the contact springs, are designated LT and LB, respectively, in the top and bottom row. As viewed from the rear, the contact spring and winding terminals are designated as shown in Fig. 56. The circuit

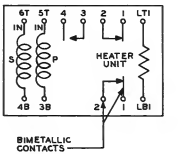


Fig. 56 — Winding and Spring Terminal Arrangement as Viewed From the Rear (terminal side) — 282-Type Relay

convention differs from that of the Y-type relay in that it shows the thermal unit (heater unit and bimetallic contact springs).

283-Type Relays

2.70 As viewed from the rear, the winding and spring terminals are designated as shown on Fig. 57. Referring to the figure, the spring terminals T and C, and the winding terminals L+ and R− are stenciled on the rear of the relay.

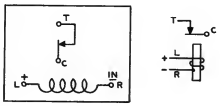


Fig. 57 – Winding and Spring Terminal Numbering as Viewed From the Rear (terminal side) — 283-Type Relay

286-, 287-, and 288-Type Relays

2.71 *Contact Springs (front view)*

(a) *286-Type Relays*

(1) As viewed from the front of the relay, there are 30 make contact positions arranged in two vertical rows of 15 positions each. Each vertical row is divided into five groups of three positions each. Each position has a single fixed contact spring and associated movable twin contact springs. The movable twin contact springs are at the right of their associated fixed contact springs. The contact arrangement and the numbering of the contact springs are shown in Fig. 58.

(2) Referring to the figure, all contact positions are designated by 2-digit numbers. The five groups of three contact positions in both vertical rows are numbered from 0 to 4 starting at the bottom. These numbers appear as the second digit in the designations of each of the three contact positions in the respective groups. In the right vertical row, the three contact positions in each of the five groups are numbered 0, 1, and 2 starting at the lowest position in the group. This number appears as the first digit in the designation of the individual positions in the respective groups in the right vertical row. In the left vertical row, the three contact positions in each of the five groups are numbered 3, 4, and 5 starting at the lowest position in the group. This number appears as the first digit in the designation of the individual positions in the respective groups in the left vertical row.

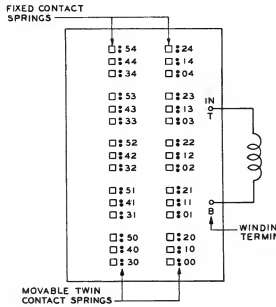


Fig. 58 – Winding and Contact Spring Arrangement as Viewed From the Front (contact side) — 286-Type Relay

(b) *287- and 288-Type Relays*

(1) As viewed from the front of the relay, there are 60 make contact positions arranged in two vertical rows of 30 positions each. Each vertical row is divided into ten groups of three positions. Each position has a single fixed contact spring and movable twin contact springs. The movable twin contact springs are at the right of their associated fixed contact springs. The contact arrangement and the numbering of the contact springs are shown in Fig. 59.

(2) Referring to the figures, all contact positions are designated by 2-digit numbers. The ten groups of three contact positions in

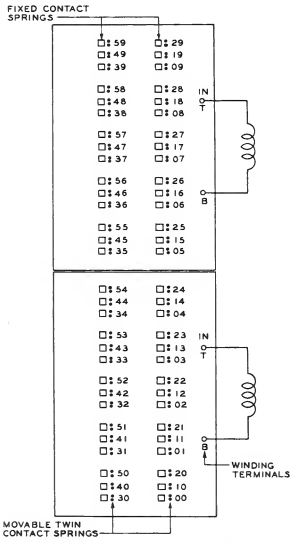


Fig. 59 — Winding and Contact Spring Arrangement as Viewed From the Front (contact side) — 287- and 288-Type Relays

both vertical rows are numbered from 0 to 9. These numbers appear as the second digit in the designations of each of the three contact positions in the respective groups. In the right vertical row, the three contact positions in each of the ten groups are numbered 0, 1, and 2 starting at the lowest position in the group. These numbers appear as the first digit in the designations of the individual positions in the respective groups in the right vertical row. In the left vertical row, the three contact positions in each of the ten groups are numbered 3, 4, and 5 starting at the lowest position in the group. These numbers appear as the first digit in the designations of the individual positions in the respective groups in the left vertical row.

2.72 *Spring Terminals (rear view)*

(a) *286-Type Relays*

(1) The terminals of the movable contact springs are designed for individual wiring. As shown in Fig. 60, they are arranged in two vertical rows of fifteen terminals each. Each vertical row is divided into five groups of three terminals each, alternate terminals being offset to facilitate wiring.

(2) The terminals of the fixed contact springs are designed for horizontal strapping and are arranged in five horizontal rows of six terminals each. The rear ends of all fixed contact springs are offset so that their terminals are located to the right of the terminals of the movable contact springs. The six fixed spring terminals in each horizontal row are associated with the six movable spring terminals in the adjacent two groups to the left.

(3) Referring to Fig. 60, all terminals are designated by 2-digit numbers. The five groups of movable spring terminals in each vertical row are numbered from 0 to 4 starting at the bottom. Similarly, the five horizontal rows of fixed spring terminals are numbered from 0 to 4 starting at the bottom. These numbers appear as the second digit in the designation of the individual terminals.

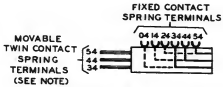
(4) In the left vertical row of movable spring terminals, the three terminals in each of the five groups are numbered 0, 1, and 2 starting at the lowest terminal in the group. Associated with these terminals are the first three fixed spring terminals in the adjacent horizontal row which are also numbered 0, 1, and 2 starting at the left end of the row. These numbers appear as the first digit in the designations of the individual terminals.

(5) In the right vertical row of movable spring terminals, the three terminals in each of the five groups are numbered 3, 4, and 5 starting at the lowest terminal in the group. Associated with these terminals are the second three fixed spring terminals in

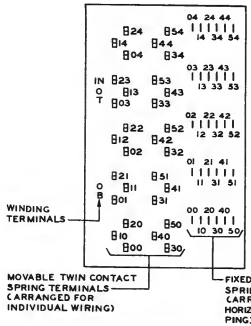
the adjacent horizontal row which are also numbered 3, 4, and 5 from left to right starting after terminal 2 in the horizontal row. These numbers appear as the first digit in the designations of the individual terminals.

(b) *287-Type Relays*

(1) The terminals of the movable contact springs are designed for individual wiring. As shown in Fig. 61, they are arranged in two vertical rows of thirty terminals each. Each vertical row is divided into ten groups of three terminals each, alternate terminals being offset to facilitate wiring.

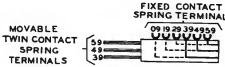

FIXED CONTACT SPRING TERMINALS
04 14 24 34 44 54
MOVABLE TWIN CONTACT SPRING TERMINALS (SEE NOTE)
54
44
34
NOTE: TERMINALS 04, 14 AND 24 ARE BEHIND TERMINALS 34, 44 AND 54

SIDE VIEW OF TERMINAL ARRANGEMENT

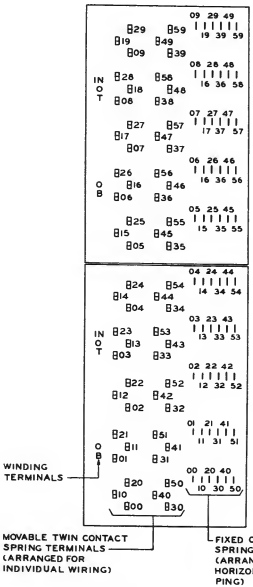


REAR VIEW OF TERMINAL ARRANGEMENT

Fig. 60 – Winding and Spring Terminal Arrangement as Viewed From the Rear (terminal side) — 286-Type Relay


FIXED CONTACT SPRING TERMINALS
09 19 29 39 49 59
MOVABLE TWIN CONTACT SPRING TERMINALS (SEE NOTE)
59
49
39
NOTE: TERMINALS 09, 19 AND 29 ARE BEHIND TERMINALS 39, 49 AND 59

SIDE VIEW OF TERMINAL ARRANGEMENT



REAR VIEW OF TERMINAL ARRANGEMENT

Fig. 61 – Winding and Spring Terminal Arrangement as Viewed From the Rear (terminal side) — 287-Type Relay

(2) The terminals of the fixed contact springs are designed for horizontal strapping and are arranged in ten horizontal rows of six terminals each. The rear ends of all fixed contact springs are offset so that their terminals are located to the right of the terminals of the movable contact springs. The six fixed spring terminals in each horizontal row are associated with the six movable spring terminals in the adjacent two groups to the left.

(3) Referring to Fig. 61, all terminals are designated by 2-digit numbers. The ten groups of movable spring terminals in each vertical row are numbered from 0 to 9 starting at the bottom. Similarly, the ten horizontal rows of fixed spring terminals are numbered from 0 to 9 starting at the bottom. These numbers appear as the second digit in the designations of the individual terminals.

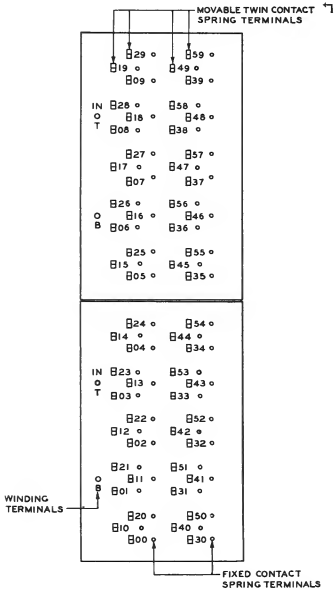
(4) In the left vertical row of movable spring terminals, the three terminals in each of the ten groups are numbered 0, 1, and 2 starting at the lowest terminal in the group. Associated with these terminals are the first three fixed spring terminals in the adjacent horizontal row which are also numbered 0, 1, and 2 starting at the left end of the row. These numbers appear as the first digit in the designations of the individual terminals.

(5) In the right vertical row of movable spring terminals, the three terminals in each of the ten groups are numbered 3, 4, and 5 starting at the lowest terminal in the group. Associated with these terminals are the second three fixed spring terminals in the adjacent horizontal row which are also numbered 3, 4, and 5 from left to right starting after terminal 2. These numbers appear as the first digit in the designations of the individual terminals.

(c) *288-Type Relays*

(1) The contact spring terminals are arranged in vertical rows as shown in Fig. 62 and are designed for individual wiring only. As shown in this figure, the 30 fixed spring terminals in each of the two vertical rows are located directly to the right of their associated movable spring terminals. The vertical rows of both movable and fixed spring terminals are divided into ten groups of three terminals each. Alternate movable and fixed spring terminals are offset to facilitate wiring.

(2) Referring to Fig. 62, all terminals are designated by 2-digit numbers. The ten groups of movable and fixed terminals in the respective rows are numbered 0 to 9 starting at the bottom. These numbers appear as the second digit in the designations of the individual terminals.



NOTE: ALL TERMINALS ARE ARRANGED FOR INDIVIDUAL WIRING

Fig. 62 – Winding and Terminal Arrangement as Viewed From the Rear (terminal side) — 288-Type Relay

(3) In the left vertical rows of movable and fixed terminals, the three terminals in each of the ten groups are numbered 0, 1, and 2 starting at the lowest terminal in the group. These numbers appear as the first digit in the designations of the individual terminals.

(4) In the right vertical rows of movable and fixed terminals, the three terminals in each of the ten groups are numbered 3, 4, and 5 starting at the lowest terminal in the group. These numbers appear as the first digit in the designations of the individual terminals.

2.73 ***Winding Terminals:*** One pair of winding terminals is provided for the 286-type relay and two pairs for the 287- and 288-type relays as shown in Fig. 60, 61, and 62, respectively. These terminals extend from the rear of the relay where external wiring is connected. Test lugs which are an integral part of the terminals are accessible from the front of the relay. As viewed from the front, the test lugs and winding terminals are at the right side of the relay. The upper terminal of each pair is designated T and the lower terminal of the pair is designated B. As viewed from the rear, the winding terminals are at the left of the spring terminals and have the same designations as when viewed from the front. In each case, the T terminal is connected to the inner end of the winding as indicated on the figure.

289-Type Relays

2.74 As viewed from the rear, the terminals are designated as shown in Fig. 63. Certain of the terminals serve as common connecting points to both windings and contact springs.

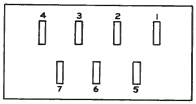


Fig. 63 – Terminal Numbering as Viewed From the Rear (wiring side) — 289-Type Relay

290-Type Relays

2.75 As viewed from the front of the frame, the armature spring terminals are designated 1M to 12M starting at the left as shown in the upper part of Fig. 64. As viewed from the rear of the frame, the winding terminal at the extreme left is designated 12R and the winding terminal at the extreme right L1. The contact spring terminals between the two winding terminals are designated 1 to 12 starting at the right.

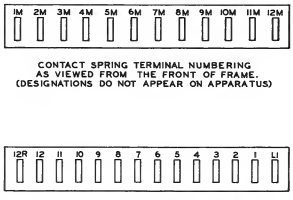
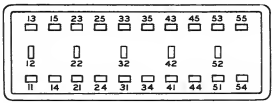

1M 2M 3M 4M 5M 6M 7M 8M 9M 10M 11M 12M
CONTACT SPRING TERMINAL NUMBERING AS VIEWED FROM THE FRONT OF FRAME. (DESIGNATIONS DO NOT APPEAR ON APPARATUS)
12R 12 11 10 9 8 7 6 5 4 3 2 1 L1
WINDING AND CONTACT SPRING TERMINAL NUMBERING AS VIEWED FROM THE REAR OF FRAME. (DESIGNATIONS DO NOT APPEAR ON APPARATUS)

Fig. 64 – Winding and Spring Terminal Numbering — 290-Type Relay


13 15 23 25 33 35 43 45 53 55
12 22 32 42 52
11 14 21 24 31 34 41 44 51 54
NUMBERING OF TERMINALS FOR MAKING TEST CONNECTIONS FROM THE FRONT OF THE FRAME

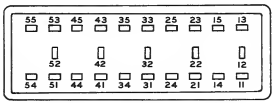
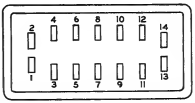


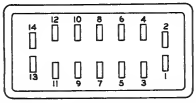
Fig. 65 – Terminal Numbering — 293-Type Relay

293-, 295-, 302-, 318-, and 331-Type Relays

2.76 As viewed from the front of the frame, the terminals for making test connections are designated as shown on the upper part of Fig. 65 through 69. As viewed from the rear of the frame, the wiring terminals are designated as shown on the lower part of the figures. The terminal numbers are molded on both the front and rear terminal blocks of the relay. Connections between terminals and the contacts and windings are shown on the relay conventions on the circuit drawing.



NUMBERING OF TERMINALS FOR MAKING TEST CONNECTIONS FROM THE FRONT OF THE FRAME



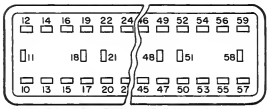
NUMBERING OF WINDING AND CONTACT SPRING TERMINALS AS VIEWED FROM THE REAR OF THE FRAME

Fig. 66 – Contact Terminal Numbering — 295-Type Relay

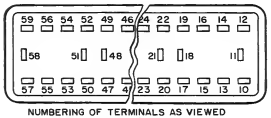
NUMBERING OF TERMINALS FOR MAKING TEST CONNECTIONS FROM THE FRONT OF THE FRAME

NUMBERING OF TERMINALS AS VIEWED FROM THE REAR OF THE FRAME

Fig. 67 – Terminal Numbering of Relay Units — 302-Type Relay

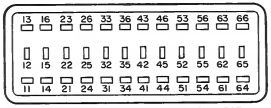


NUMBERING OF TERMINALS FOR MAKING TEST CONNECTIONS FROM THE FRONT OF THE FRAME

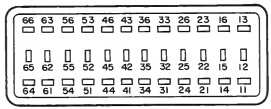


NUMBERING OF TERMINALS AS VIEWED FROM THE REAR OF THE FRAME

Fig. 68 – Terminal Numbering — 318-Type Relay



NUMBERING OF TERMINALS FOR MAKING TEST CONNECTIONS FROM THE FRONT OF THE FRAME



NUMBERING OF TERMINALS AS VIEWED FROM THE REAR OF THE FRAME

Fig. 69 – Terminal Numbering — 331-Type Relay

294-Type Relays

2.77 The winding and spring terminals of the 294-type relays, as viewed from the bottom are designated as shown in Fig. 70.

310-Type Relays

2.78 Refer to 2.17 for winding and spring terminal arrangement and numbering of 310-type relays.

311-, 312-, and 317-Type Relays

2.79 As viewed from the rear, the winding and spring terminals are designated as shown in Fig. 71 and 72.

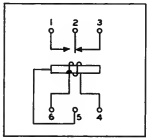


Fig. 70 – Winding and Spring Terminal Numbering as Viewed From the Bottom — 294-Type Relay

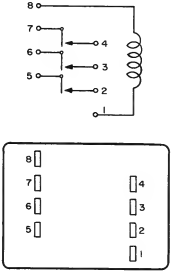


Fig. 71 – Winding and Spring Terminal Numbering — 311-Type Relay

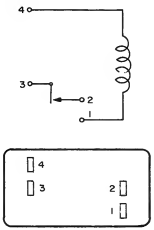


Fig. 72 – Winding and Spring Terminal Numbering — 312- and 317-Type Relays

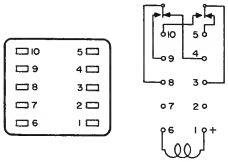


Fig. 73 – Winding and Spring Terminal Numbering — 313-Type Relays

314-Type Relays

2.80 As viewed from the rear, the winding and contact terminals are arranged in two horizontal rows of 4 terminals each. The upper row of terminals is numbered 1 through 4 starting at the left. The lower row of terminals is numbered 5 through 8 starting at the left as shown in Fig. 74.

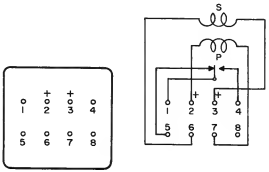


Fig. 74 – Winding and Spring Terminal Numbering — 314-Type Relays

316-Type Relays

2.81 The contact and winding terminals are numbered in accordance with the BSP figures referred to on the circuit requirements table. As viewed from the rear, the winding and spring terminals are designated as shown in Fig. 75.

322-Type Relays

2.82 As viewed from the bottom, the winding terminals are designated as shown in Fig. 76. In relation to the winding terminals, the spring terminals, located on the mounting surface of the relay (relay top) are arranged as shown in Fig. 76.

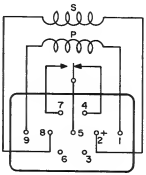


Fig. 75 – Winding and Spring Terminal Numbering — 316-Type Relays

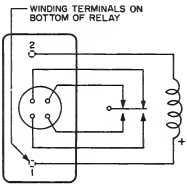


Fig. 76 – Winding and Spring Terminal Numbering — 322-Type Relays

323- and 326-Type Relays

2.83 As viewed from the rear, the winding and contact terminals are arranged in two horizontal rows. The upper row of terminals is numbered 5 and 2 respectively, starting at the left. The lower row of terminals is numbered 4, 3, and 1 respectively, starting at the left as shown in Fig. 77.

324- and 325-Type Relays

2.84 The contact and winding terminals are numbered in accordance with the circuit diagram printed on the side of the relay cover. As viewed from the terminal side of the relay, the winding and spring terminals are designated as shown in Fig. 78 and 79.

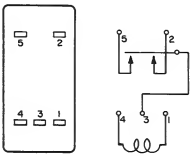


Fig. 77 – Winding and Terminal Numbering — 323- and 326-Type Relays

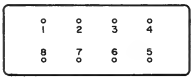


Fig. 78 – Terminal Numbering as Viewed From the Terminal Side — 324-Type Relay

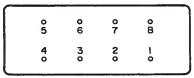


Fig. 79 – Terminal Numbering as Viewed From the Terminal Side — 325-Type Relay

327-, 328-, 329-, and 330-Type Relays

2.85 As viewed from the rear, the winding and spring terminals are designated as shown in Fig. 80 through 82.

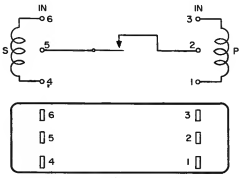


Fig. 80 – Winding and Spring Terminal Numbering — 327-Type Relay

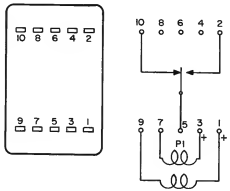


Fig. 81 – Winding and Spring Terminal Numbering — 328- and 330-Type Relays

KS- CODED RELAYS

KS-3067, KS-5013, KS-5381, KS-5483, KS-6319, and KS-6724 Relays

2.86 The winding and contact numbering for these relays is based on the relay mounted in a vertical position with the armature lowermost. The contact terminals of these relays are designated with one numeral and two letter designations as shown in Fig. 83. The first letter, L or R, indicates the left or right side, respectively, of the relay coil on which the terminal is mounted. The numeral (1 or 2) indicates the

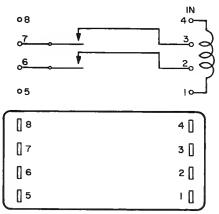


Fig. 82 – Winding and Spring Terminal Numbering — 329-Type Relay

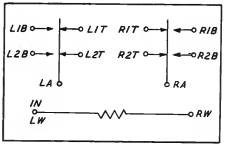


Fig. 83 – Winding and Spring Terminal Arrangement as Viewed With the Relay Mounted in a Vertical Position With the Armature Lowermost — KS-3067, KS-5013, KS-5381, KS-5483, KS-6319, and KS-6724 Relays

location of the terminal with respect to the free end of the armature spring, 1 indicating the terminal toward the free end of the armature spring, and 2 indicating the terminal toward the armature end. The second letter, T (top) or B (bottom), indicates the position of the terminal with respect to the base, the letter T indicating the terminals farthest from the base, and the letter B indicating the terminals on the base. For example, the designations L1T means the contact on the left side of the relay at the free end of the spring and farthest from the base as shown in Fig. 83. The armature and windings are designated by two letters; the first letter, L or R, indicating the left or right side, respectively, of the relay coil and the second letter, A or W, indicating the armature and winding terminals, respectively.

KS-5350 and KS-5451 Relays

2.87 In certain cases, the designations which are shown for these relays on the circuit are also stamped on the relays. Where this is not the case the following general numbering scheme applies, based on viewing the relay from the terminal side with the relay mounted vertically and the armature pivot below the center line of the coil.

2.88 The contacts in any vertical row of terminals number from the top down beginning with 1 in the right row of terminals. Where the top terminal in this row has a letter designation in accordance with 2.89, 2.90, and 2.91, the number 1 is applied to the terminal directly below it. (See Fig. 84.)

2.89 Where the relay has two horizontal rows of terminals the bottom row is designated by the letter B preceded by the same number as the nearest terminal above. (See Fig. 85.)

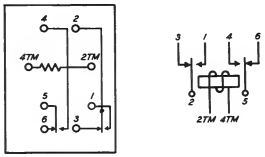


Fig. 84 – Winding and Spring Terminal Arrangement (terminal side — KS-5350 and KS-5451 Relays Having Four Horizontal Rows of Terminals

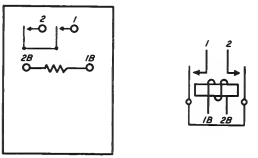


Fig. 85 – Winding and Spring Terminal Arrangement (terminal side) — KS-5350 and KS-5451 Relays Having Two Horizontal Rows of Terminals

2.90 Where the relay has either three or five horizontal rows of terminals, the middle row of terminals is designated by the letter M preceded by the same number as the nearest terminal above. (See Fig. 86 and 87.)

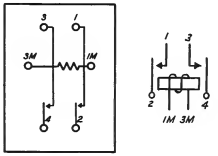


Fig. 86 – Winding and Spring Terminal Arrangement (terminal side) — KS-5350 and KS-5451 Relays Having Three Horizontal Rows of Terminals

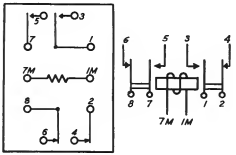


Fig. 87 – Winding and Spring Terminal Arrangement (terminal side) — KS-5350 and KS-5451 Relays Having Five Horizontal Rows of Terminals

2.91 Where the relay has either four or six horizontal rows of terminals the upper middle row of terminals is designated by the letters TM preceded by the same number as the nearest terminal above. (See Fig. 84 and 88.)

KS-6902, KS-6903, and KS-7252 Relays

2.92 The contacts of each unit of these relays are numbered from left to right starting at the top row and continuing through the

bottom row of contacts as viewed from the front as shown in Fig. 89. The bus terminals are designated A1 and A2 numbered from left to right as viewed from the front of the relay. The winding terminals are designated as covered in 2.86.

KS-7800 through KS-7850 and KS-8280 Adams-Westlake Relays

2.93 The contact and wiring terminals for these relays are designated as shown in Fig. 90 as viewed from the rear or terminal side of the relays.

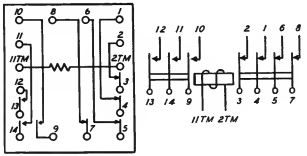


Fig. 88 – Winding and Spring Terminal Arrangement (terminal side) — KS-5350 and KS-5451 Relays Having Six Horizontal Rows of Terminals

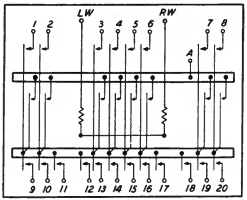


Fig. 89 – Winding and Spring Terminal Arrangement as Viewed With the Relay Mounted in a Vertical Position With the Armature Lowermost — KS-6902, KS-6903, and KS-7252 Relays

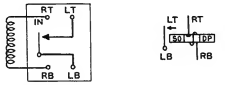


Fig. 90 – Winding and Spring Terminal Arrangement as Viewed From the Rear (terminal side) — KS-7800 Through KS-7850 and KS-8280 Adams-Westlake Relays

KS-7900, KS-7901, KS-8383, and KS-8388 Relays (Sensitrol)

2.94 The terminal numbering which appears on the circuit requirements table is marked on the relays.

KS-8171 and KS-8331 Adams-Westlake Relays

2.95 These Adams-Westlake relays have loose leads and no specific terminal numbering.

KS-13542 and KS-13543 Relays

2.96 The heater winding terminals are numbered 2 and 3, and the contact terminals are numbered 5 and 7. Terminals 1 and 4 are not connected. Looking at the bottom of the relay, the terminals are numbered consecutively clockwise starting at the key.

Dashpot Relays

2.97 The springs are numbered as covered in 2.51. The winding terminals are designated as shown in Fig. 91 viewing the relay from the top with the springs on the right.

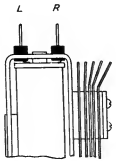


Fig. 91 – Winding Terminal Arrangement as Viewed From the Top — Dashpot Relays

3. SWITCHES

197- and 198-Type Switches and Associated Parts

3.01 ***Contact Springs:*** The designations shown for the contact spring assemblies of 197- and 198-type switches are:

RON	=	Rotary Off-Normal Springs
R STP	=	Rotary Step Springs
ROT	=	Rotary Interrupter Springs
VERT	=	Vertical Interrupter Springs
VON	=	Vertical Off-Normal Springs
REL	=	Release Contact Springs
NPS	=	Normal Post Springs
L NPS	=	Left Normal Post Springs
R NPS	=	Right Normal Post Springs

Unless otherwise specified on the circuit requirements table, these contact springs number consecutively outward from the frame upon which the spring assembly is mounted, as viewed from the contact end of the spring, except as indicated in notes 2 and 3. When springs in these assemblies are used as connecting points these springs are indicated by the designation of the spring assembly preceded by the spring number. For example: 3(VON) indicates the third spring in the vertical off-normal spring assembly; 2(11 R STP) indicates the second spring in the 11th rotary step spring assembly.

Note 1: The vertical off-normal springs were formerly designated ON and the 11th rotary step spring was formerly designated CAM SPG.

Note 2: On vertical interrupter springs of earlier switches having a vertical armature arm, the No. 1 spring is the upper spring and the No. 2 spring is the lower spring.

Note 3: Normal post springs number from the normal post outward and are designated 1R, 2R, etc, when mounted to the right of the normal post and 1L, 2L, etc, when mounted to the left of the normal post.

3.02 ***Switch Plugs and Jacks:*** The springs of switch jacks and plugs are numbered from the center outward as viewed from the rear of the switch with the even-numbered springs on the left and the odd-numbered springs on the right. Connections to the various springs are indicated by the abbreviation JK or PG preceded by the jack or plug spring number.

3.03 ***Wipers:*** When it is necessary to connect to one or more wipers of a switch, the wipers to which connections should be made are indicated by the symbol WPR followed by the particular designation of that wiper as shown on the associated circuit schematic drawing. The bank wipers referred to in the circuit requirements table appear on the schematic drawing in the same order in which they are located on the switch shaft. Fig. 92 shows the relative location of the wipers on a 200-point line finder and the designations given for them on the schematic drawing. On switches having four bank wipers, the wipers are designated as shown in Fig. 92 except that the added wiper at the bottom has the designation A1 and A.

Note: On some of the earlier circuits the symbol BRUSH or BR was used as a designation for the wipers in place of WPR.

3.04 ***Test Jacks:*** The springs on test jacks are numbered consecutively from top to bottom. For example: TST JK 2 and TST JK 3 should be interpreted as the second and third springs of the test jack, counting from the top down.

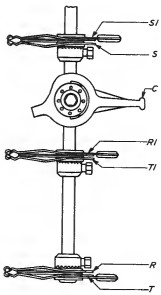


Fig. 92 – Bank Wiper Terminal Designations — 197- and 198-Type Switches

3.05 *Sleeve Cutoff Jack:* Facing the front of the switch, the No. 1 spring of the sleeve cutoff jack of 197- and 198-type switches is at the left, and the No. 2 spring is at the right.

202-, 211-, and 212-Type Switches

3.06 The spring terminals of these switches are numbered consecutively from 1 up from right to left as viewed from the terminal end of the switch as shown in Fig. 93. Where the word top or upper is associated with a spring combination on the schematic or if the suffix T is used in connection with a terminal number, this refers to springs in the upper row of terminals. Similarly, the term lower or bottom or the suffix B refers to terminals in the lower row.

Note: Prior to February 1, 1942, various numbering schemes were used for the terminals of these switches. In some cases the individual contact groups were numbered from 1 up, the odd groups being at the top of the switch and the even groups being at the bottom of the switch, the groups being numbered from right to left as viewed from the rear. In other cases the various contact groups were lettered from right to left as viewed from the rear, contact group A being the bottom at the right, contact group B being the top at the right, contact group C being the second one from the right at the bottom, D the second one from the right at the top, etc. In some of these cases the individual groups were numbered from 3 to 1, respectively, from right to left as viewed from the terminal side of the switch.

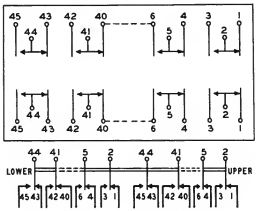


Fig. 93 – Spring Terminal Arrangement as Viewed From the Rear (terminal side) — 202-, 211-, and 212-Type Switches

216- and 217-Type Switches

3.07 The contact springs are numbered consecutively in vertical rows of 10 pairs of springs starting at the bottom with pair 0 in the row nearest the armature as shown in Fig. 94, and continuing with each vertical row of springs from right to left facing the contact side of the switch. On the schematic drawing the contact springs are not necessarily shown in numerical order.

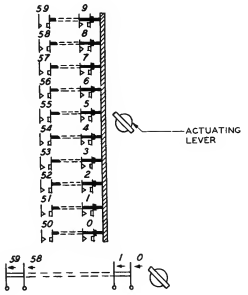


Fig. 94 – Contact Spring Arrangement as Viewed From the Front (contact side) — 216- and 217-Type Switches

300-, 301-, 302-, 303-, 304-, 305-, 306-, 307-, 308-, →314-, 315-, 318-, 324-, 325-, 328-, 334-, and 338-Type Switches (crossbar types)

3.08 *Vertical Units:* The individual vertical units are numbered as follows.

→ (a) *300-, 304-, 314-, 324-, and 334-Type Switches* (crossbar type switches having ten or fewer vertical units) : The vertical units are numbered from 0 to 9 starting at the left end of the switch as viewed from the contact side.

→ (b) *301-, 303-, 305-, 307-, 308-, 315-, 318-, 325-, 328-, and 338-Type Switches* (crossbar-type switches having more than ten and maxi-

mum of twenty vertical units): These switches are considered as being composed of two separate switch units, a left switch unit and a right switch unit. The first ten units starting at the left end of the switch facing the contact side are numbered from 0 to 9 and are so designated. On subscriber sender links, district links, office links, and incoming link switches the number is followed by the letter L; for example, 3L, which indicates the fourth vertical unit from the left facing the contact side of the switch. The second ten vertical units starting with the 11th unit from the left are also numbered from 0 to 9 and are so designated. On the above mentioned links the number is followed by the letter R; for example, 5R, which indicates the 16th vertical unit from the left facing the contact side of the switch. On switches used in other circuits the numbering is varied.

Note: On certain switches having 20 vertical units (for example the terminating sender test connector of No. 1 crossbar) when more than six crosspoints must be operated at one time, the hold magnets are operated in pairs. The magnets operated in pairs are designated H0, H0A; H1, H1A; - - - H8, H8A; H9, H9A starting at the left as viewed from the contact side of the switch. Pairs 0-4 correspond to the left half of the switch and pairs 5-9 correspond to the right half of the switch.

(c) ***302- and 306-Type Switches*** (crossbar-type switches having 19 vertical units): The vertical units of these switches are numbered the same as 301- and similar-type switches as outlined in (b) except that the 9 units at the right (11th to 19th verticals from the left) are numbered 0 to 8. The letters L and R are not used.

3.09 ***Holding Magnet and Holding Off-Normal Springs:*** The holding off-normal springs are designated by a numeral followed by a reference to the particular vertical unit with which the springs are associated; for example, 4 (HLD2), which indicates the fourth off-normal spring of vertical unit 2. The first numeral indicates the position of the spring in the assembly, the springs being numbered from right to left starting with 1 facing the contact side of the switch. Balancing spring (springs not equipped with soldering terminals or contacts) are not numbered. The balancing spring is the first spring in the pile-up and the spring immediately to its left as viewed from the contact side of the switch is numbered 1. The holding magnets are numbered the same as the vertical units as described in 3.08. The winding terminals are designated with a letter T (top) or B (bottom), as shown in Fig. 95, followed by the reference to the particular magnet involved; for example, T (HLD4), which indicates the top winding terminal of holding magnet 4.

Exception: On 324-, 325-, and 328-type switches certain molded holding off-normal springs have two rows of terminals. These are designated 1T, 2T, 1B, and 2B, those in the top row being designated T and those in the bottom row being designated B. The springs are numbered from right to left starting with 1 facing the contact side of the switch. The holding magnet terminals of these switches are designated L (left) and R (right) as viewed from the front of the switch, the R terminal being connected to the inner end.

Note: A soldering terminal without a spring is included in some holding off-normal spring assemblies. This terminal, designated C on the circuit drawing, is ignored in the numbering of the holding off-normal springs. Viewed from the rear, the C terminal is located to the left of the No. 1 spring on assemblies held by a nut and to the right of the No. 6 spring on assemblies held by a screw.

3.10 ***Selecting Magnets:*** The selecting magnets are numbered 0 to 9 in accordance with the levels which they serve, starting with 0 for the magnets serving the bottom level. The selecting magnets for levels 0, 1, 4, 5, 8, and 9 are located at the left facing the contact side of the switch; and the selecting magnets for levels 2, 3, 6, and 7 are located at the right. The winding terminals are designated with two letters RB, RT, LB, and LT, as indicated in Fig. 73, followed by a reference to the particular selecting magnet involved; for example, LB(SEL3), which indicates the left bottom terminal of magnet 3. Magnet 3 is the first magnet from the

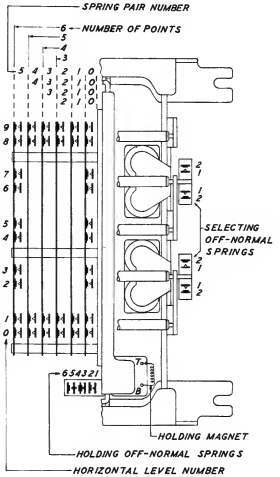


Fig. 95 – Partial View of Winding and Spring Contact Arrangement as Viewed From the Front (contact side) — 300- and Similar-type Switch Crosspoints, Holding and Selecting Magnets, and Associated Off-Normal Springs

bottom of the switch at the right facing the contact side of the switch. The inner end of the winding is connected to the RB terminal on the side of the switch having six magnets and to the LT terminal on the side of the switch having four magnets. The L and R mean left and right of the individual selecting magnets as viewed from the contact side of the switch and do not refer to the side of the switch on which the selecting magnets are located.

Note 1: Prior to June 1, 1941, the selecting magnets had both single and double terminals. In this case the single terminal was designated S and the double terminal was designated D, the double terminal being a bifurcated soldering terminal. On selecting magnets located at the left end of the switch facing the contacts, the single winding terminal was at the top and the bifurcated terminal was at the bottom. On selecting magnets mounted at the right end of the switch facing the contacts, the bifurcated terminal was located at the top and the single terminal at the bottom. The inner end of the winding was always connected to the double terminal.

Note 2: Where other numbering schemes are used for the select magnets the numbering is stenciled on the parts.

Fig. 96 – Winding Terminal Arrangement as Viewed From the Front (contact side) — 300- and Similar-type Switch Selecting Magnets

3.11 *Selecting Off-Normal Contact Springs:* The selecting off-normal contact springs are designated by a numeral followed by a reference to the particular selecting magnet with which the springs are associated, as for example, 2 (SEL3), which indicates the second spring of selecting unit 3. The numeral indicates the position of the contact spring in the assembly, springs being numbered up and down from the centering spring stop starting with 1 for the contact spring nearest the centering spring stop. Springs not equipped with soldering terminals or contacts are not numbered.

3.12 *Crosspoints and Crosspoint Contacts:* The crosspoints are referred to in accordance with the particular vertical unit and horizontal level, and the location of the contact in its assembly. The individual pairs of contacts at a crosspoint are numbered from right to left beginning with 0 for the contacts nearest the holding armature, as shown in Fig. 95. For example, 3L4-5 would indicate the sixth pair of contacts from the armature in the fourth vertical unit from the left and the fifth level from the bottom.

Note: In the 0 horizontal level of the D-159187 switch only crosspoint contacts 3,

4, and 5 are provided; while in horizontal level 1 only contacts 0, 1, and 2 are provided.

Automatic Electric Company 25-Point Rotary Switches

3.13 See 4.16.

Sequence Switches

3.14 The four springs of a sequence switch cam are known as left outer, left inner, right outer, and right inner according to their position as viewed from the front (spring side). The left side of the cam is that side nearer the drive magnet and the springs on that side of the cam are the left springs. The two springs nearest the cam spindle are the inner springs. The springs, except those on the A cam, are numbered from the cam side as follows:

1 = Left Inner
2 = Left Outer
3 = Right Outer
4 = Right Inner

Note 1: On the A cam the right inner spring is numbered 1 and the right outer spring is numbered 2. There are no springs on the left side of this cam.

Note 2: On the Z cam the right outer (3) and the right inner (4) springs are never provided.

3.15 The information for connection to sequence switch springs contains the spring number and the cam letter designation. For example, SS2-Q indicates sequence switch spring 2 (left outer) of cam Q. SS4-L indicates sequence switch spring 4 (right inner) of cam L. Where more than one sequence switch is employed in a circuit, the cam designations include the sequence switch number. For example, Q-2 indicates cam Q of number 2 sequence switch. The numbering of sequence switch springs in this case is SS2-Q-2, SS4-Q-2, etc. See Fig. 97 and 98 for the method of numbering.

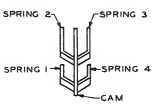


Fig. 97 – Sequence Switch Spring Numbering as Viewed From the Front (spring side) of the Switch

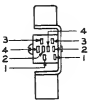


Fig. 98 – Sequence Switch Spring Terminal Numbering as Viewed From the Rear (terminal side) of the Switch

3.16 ***KS-5264 Transfer Switches:*** With the switch mounted vertically with the pivot below the center of the coil, when viewed from the terminal side of the switch, the contacts in any row of terminals number from the top down beginning with 1 in the right row of terminals and progressing to the rows toward the left. The three winding terminals number from right to left as shown in Fig. 99.

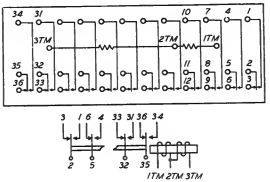


Fig. 99 – Winding and Spring Terminal Arrangement as Viewed From Rear (terminal side) — KS-5264 Transfer Switch

4. OTHER APPARATUS

Commutator Terminals — Panel

4.01 The method of designating commutator terminals is shown on the circuit drawing and in Section 026-120-701.

Conductors

4.02 ***Terminating trunk conductors*** are indicated by the designation TRK, followed by the conductor designations T for Tip, R for Ring, and S for sleeve. For example:

TRK T — Tip Conductor of Trunk
TRK R — Ring Conductor of Trunk
TRK S — Sleeve Conductor of Trunk

4.03 ***Through trunk conductors including district, office, incoming, and final selectors, etc,*** are indicated by either the designation INC or OG followed by the conductor designations T, R, and S. For example:

INC T — Tip Conductor of Incoming Trunk
OG R — Ring Conductor of Outgoing Trunk
INC S — Sleeve Conductor of Incoming Trunk

Should the circuit be provided with a test jack where the tip, ring, or sleeve is readily accessible, the notations TST JK T, TST JK R, or TST JK S will be used; similarly, if the tip, ring, or sleeve of the trunk is accessible at some convenient point, such as a sequence switch spring or relay contact spring, the notation indicates that point.

4.04 ***Line circuit conductors*** are indicated by the designation LN, followed by either T or R. For example:

LN T — Tip Conductor of Line
LN R — Ring Conductor of Line

4.05 ***Cord conductors*** are indicated by the designation CD, followed by either T, R, or S. For example:

CD T — Tip Conductor of Cord
CD R — Ring Conductor of Cord
CD S — Sleeve Conductor of Cord
A CD T — Tip Conductor of Answering Cord
C CD R — Ring Conductor of Calling Cord

4.06 ***Jack conductors*** are indicated by the designation JK, followed by T, R, or S. For example:

JK T — Tip Conductor of Jack
JK R — Ring Conductor of Jack
JK S — Sleeve Conductor of Jack
A JK T — Tip Conductor of Answering Jack
M JK R — Ring Conductor of Multiple Jack

Drops

4.07 The contact and winding terminals of drops are designated as shown in Fig. 100 through 102.

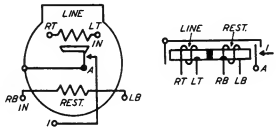


Fig. 100 — Winding and Spring Terminal Arrangement as Viewed From the Rear (terminal side) — 22-Type Drop

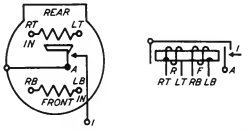


Fig. 101 — Winding and Spring Terminal Arrangement as Viewed From the Rear (terminal side) — 35-Type Drop

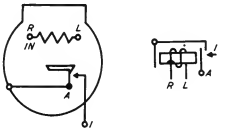


Fig. 102 — Winding and Spring Terminal Arrangement as Viewed From the Rear (terminal side) — 56-Type Drop

Clutch and Trip Magnets

4.08 The connecting points for clutches and trip magnets are covered in the individual apparatus requirement and adjusting procedure sections covering this apparatus.

Inductors

4.09 ***274-Type Inductors:*** The wiring terminals of these inductors are numbered from 1 up beginning at the right as viewed from the wiring side, as shown in Fig. 103.

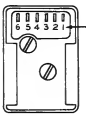


Fig. 103 – Winding Terminal Numbering as Viewed From the Rear (wiring side) of 274-type Inductors (retard coils)

Interrupters

4.10 ***149-, 152-, 160-, 161-, 164-, 165-, 166-, and 167-Type Interrupters (reciprocating bar type):*** Contacts closed when the interrupter is normal (cam roller resting on that portion of the cam cutting nearest the center of the cam) are back contacts and the back contact spring is designated B. Contacts closed when the interrupter is operated (cam roller resting on that portion of the cam cutting farthest from the center of the cam) are front contacts and the front contact spring is designated F. The operating spring is not designated. On switchhook spring combinations, two front contact springs are provided and these springs are designated F1 and F2, the F2 spring being farther from the operating spring. (See Fig. 104.)

4.11 ***173-Type Interrupters:*** The terminal designations for the interrupter are stamped on the interrupter.

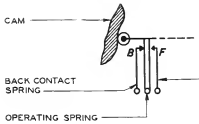


Fig. 104 – Contact Numbering on 149-, 152-, 160-, 161-, 164-, 165-, 166-, and 167-Type (reciprocating bar) Interrupters

Networks

176-, 177-, 178-, 179-, 180-, 181-, 182-, 183-, 184-, 185-, and 186-Type Networks

4.12 The terminals of these networks are lettered, as indicated in Fig. 104, as viewed from the terminal end of the network. The C terminal is designated on the apparatus in cases where there are three terminals. The A terminal is located adjacent to the network code marking. The 184-, 185A-, and 186-type networks have no terminals and are wired directly to the apparatus. These leads and the terminals on the 180-type network are not designated.

Registers

4.13 ***5-, 12-, 14-, 15-, 16-, and 18-Type Message Registers:*** Connections to the frame of these registers are indicated by FRAME. Other terminals are designated as shown in Fig. 106.

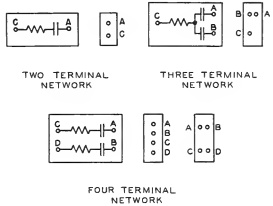


Fig. 105 – Terminal Arrangement of 176-, 177-, 178-, 179-, 181-, 182-, and 183-Type Networks as Viewed From Terminal Side

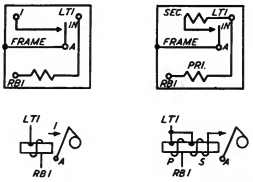


Fig. 106 – Winding and Spring Terminal Arrangement as Viewed From the Rear (terminal side) — 5-, 12-, 14-, 15-, 16-, and 18-Type Message Registers

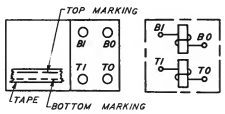


Fig. 107 – Winding Terminal Arrangement of KS-3106 (single pen) and KS-3107 (double pen) Foote-Pierson Pen Registers

4.14 *KS-3106 and KS-3107 Pen Registers:* The winding terminals of the KS-3106 single pen register are lettered I for inner and O for outer. The double pen registers per KS-3107 are numbered and lettered as shown in Fig. 107. The B binding posts are associated with the coils which control the bottom tape marking and the T binding posts are associated with the coils which control the top tape marking as shown in Fig. 107. The I represents the binding posts nearest the mechanism and the O represents the binding posts farthest from the mechanism.

40-Type Resistors

4.15 The winding terminals are numbered from right to left facing the terminal side of the resistor as shown in Fig. 108. The terminal numbers are followed by the suffix T (top) or B (bottom) to indicate that the terminal is in the top or bottom row of terminals.

Fig. 108 – Terminal Arrangement as Viewed From the Rear (terminal side) — 40-Type Resistors

Selectors

4.16 *200-, 206-, 209-, and 211-Type Selectors and Automatic Electric Company 25-Point Rotary Switches:* Facing the front of the apparatus the interrupter contact springs are numbered consecutively starting at the interrupter spring mounting bracket and numbering toward the front of the switch. The winding connecting points are covered in the individual apparatus requirement and adjusting procedure sections covering this apparatus.

4.17 *204-Type Selectors:* The contact terminals are numbered consecutively from the mounting bracket outward. The winding terminals are designated as shown in Fig. 109.

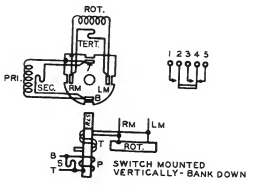
Signals

4.18 The contact and winding terminals of signals are designated as shown in Fig. 110 through 112.

1- and 2-Type Timers

4.19 The contact springs are numbered consecutively from left to right facing the contact side of the timer and from right to left facing the terminal side. Balancing springs (springs not equipped with contacts) are not numbered. (See Fig. 113.)

4.20 Winding terminals are designated with a letter and numeral. Where the letter follows the numeral, the numeral is the same as that of the contact terminal at the immediate right, facing the terminal side, and indicates the position of the winding terminal with respect to the contact terminal. Where the numeral follows the letter, it is always 1 and indicates that the winding terminal is at the extreme right end position in the row of terminals when facing the terminal side of the timer.



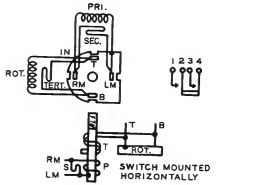


Fig. 109 – Winding and Spring Terminal Arrangement as Viewed From the Rear (terminal side) — 204-Type Selectors

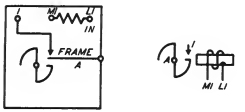


Fig. 110 – Winding and Spring Terminal Arrangement as Viewed From the Rear (terminal side) — 34-Type Signal

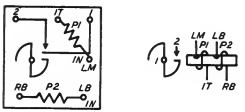


Fig. 111 – Winding and Spring Terminal Arrangement as Viewed From the Rear (terminal side) — 41-Type Signal

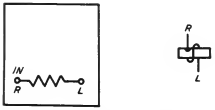


Fig. 112 – Winding Terminal Arrangement as Viewed From the Rear (terminal side) — 42-Type Signals

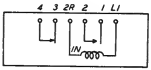


Fig. 113 – Winding and Spring Terminal Arrangement as Viewed From Rear (terminal side) — 1- and 2-Type Timers

3A Timers

4.21 Facing the front of the timer the cams are lettered in alphabetical order from left to right starting with A. The designations of the winding and contact spring terminals are stamped on the front of the terminal plate. The bottom row of terminals is numbered 1 to 5, starting at the right, the middle row is numbered from 6 to 10 starting at the right, and the top row is numbered from 11 to 15. Facing the rear of the timer, the terminals are similarly numbered from left to right. The terminals of the 18A connecting block are numbered to correspond with the numbering of the timer terminals as viewed from the rear. The terminal numbers are stamped on the top and bottom of the connecting block. The timer and connecting block terminal numbering is shown on the circuit drawing.

REASONS FOR REISSUE

1. To add Table of Contents.
2. To add 310-type relays (2.17 and Fig. 5 through 7).
3. To add AL-type relays (2.26, and Fig. 8 and 10).

4. To add AM-type relays (2.29 through 2.31, and Fig. 12 and 13).
5. To add BF-, BJ-, and BL-type relays (2.32 through 2.34, and Fig. 14 through 18).
6. To add MA- and MB-type relays (2.35, 2.36, and Fig. 19 through 22).
7. To add 305-, 307-, and 309-type relays (2.51 and Fig. 43).
8. To add 320- and 321-type relays (2.67 and Fig. 54).
9. To revise Fig. 62 to offset the alternate fixed contacts on 288-type relays.
10. To revise Fig. 63 to relocate 289-type relay terminals 5, 6, and 7.
11. To revise Fig. 64 to redesignate 290-type relay terminal L1 (previously designated 1L).
12. To add 318- and 331-type relays (2.76, and Fig. 68 and 69).
13. To add 311-, 312-, 313-, 314-, 316-, and 317-type relays (2.79 through 2.81, and Fig. 71 through 75).
14. To add 322- through 330-type relays (2.82 through 2.85, and Fig. 76 through 82).
15. To add 334- and 338-type switches (3.08).
16. To add 15-, 16-, and 18-type registers (4.13 and Fig. 106).